MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

TDB1131 – DATABASE SYSTEMS

(All sections / Groups)

4 JUNE 2018
9.00 a.m. – 11.00 a.m.
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **6 QUESTIONS** with **TWO** sections only.
2. Attempt all questions in **Section A** and attempt **TWO** out of **THREE** questions in **Section B**.
3. If you attempt all questions in Section B, only the first two questions are considered.
4. You are allowed to use calculators in this examination.
5. Please write all your answers in the Answer Booklet provided.

SECTION A: Answer ALL (30 marks)

QUESTION 1

Rajesh owns a car rental shop. To maintain the rental records in a systematic way, Rajesh assigns a unique ID to each of his customers. He allows each customer to rent more than one car. The rented date and returned date are recorded as well. Each car may be rented by any customers at any time as long as the car is available. The rental shop provides various kinds of car models. Each car model will have more than one car with different colour. Road tax must be paid before the car is rented. For example, Rajesh owns 3 Proton Exora and each Proton Exora has a different due date of road tax. Rental fee is charged according to the car model.

(a) Based on the scenario above, please construct TWO appropriate business rules. [2 marks]

(b) Please design an entity relationship diagram (ERD) according to your business rules in (a) by using crow's foot notation. Please include this information in the ERD: at least THREE attributes in each entity, primary key and foreign key. Please transform many to many relationships if any. [8 marks]

Continued.....

QUESTION 2

The Gill Art Gallery wishes to maintain data of their customers, artists and paintings. They may have several paintings by each artist in the gallery at one time. Paintings may be bought and sold several times. In other words, the gallery may sell a painting, then buy it back at a later date and sell it to another customer. The customer history form of the gallery is shown in Figure 1. The attributes in Figure 1 are Customer_Name, Customer_Address, Customer_Phone, Artist_ID, Artist_Name, Art_Title, Art_Price, and Pur_Date. Assume you need to perform the normalisation process to reduce the redundancy in the records of the gallery. [Hints: you may need to add in new primary keys and/or foreign keys during the normalisation process]

Gallery Customer History Form

Customer Name

Jackson Ng Wei Han, Phone (+606) 284-6783
Jalan PKAK 1 & PKAK 2,
Pusat Komersial Ayer Keroh,
75450 Melaka, Malaysia.

Purchases Made

Artist	Title	Purchase Date	Sales Price
03 - Carol Channing	Laugh with Teeth	17/09/2017	7000.00
15 - Dennis Frings	South toward Emerald Sea	11/05/2017	1800.00
03 - Carol Channing	At the Movies	14/02/2016	5550.00
15 - Dennis Frings	South toward Emerald Sea	15/07/2014	2200.00

Figure 1. Customer History Form

(a) Illustrate the 1st normalisation process based on the given information in Figure 1. Please underline the selected composite keys. [3 marks]

(b) Based on your answer in (a), please continue to demonstrate 2nd or/and 3rd normalisation process. Please label your primary and foreign keys. [7 marks]

Continued.....

QUESTION 3

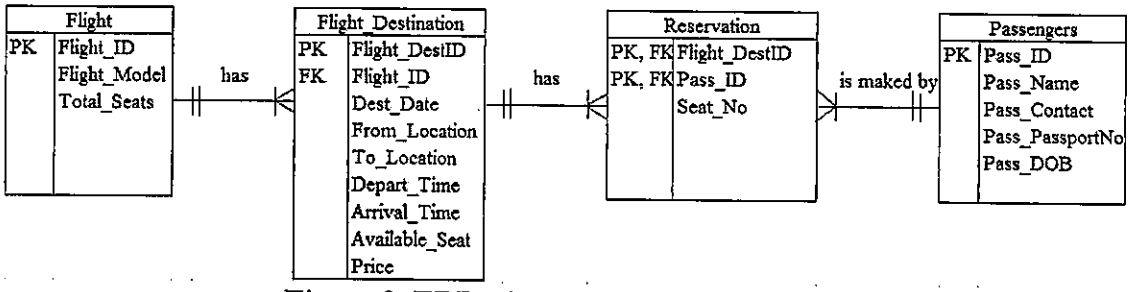

Figure 2. ERD of a Flight Booking System

The ERD of a flight booking system is shown in Figure 2. Solve the following questions by using appropriate SQL commands. Assume the date format is YYYY-MM-DD.

(a) Create table Flight_Destination (see Table 1 for the sample input) with the following conditions:
   (i) Must have a primary key where null value is disallowed.
   (ii) A foreign key where records of both parent and child tables are update together when changes occur but it has restriction on delete.
   (iii) Please use appropriate data type for each attribute.

Table 1. Sample Input

Flight_ DestID	Flight_ID	Dest_Date	From_L ocation	To_Location	Depart Time	Arrival Time	Available Seat
TAI1123 56	AK123	2018-05-05	KLIA	Tao Yuan International Airport	01.30	15.45	75
KUL112 357	DT111	2018-05-06	Osaka Kansai Internati onal Airport	KLIA	08.20	11.20	80

[6 marks]

(b) Please write SQL command to retrieve the passenger information for reservation with Flight_DestID = KUL112357. [2 marks]

(c) Please use appropriate SQL command to solve this request: a passenger with ID = G112356 wants to change the seat number from A001 to G042 for his reservation with Flight_DestID = MEL223321. Assume that G042 is available. [2 marks]

Continued.....

SECTION B: Attempt TWO out of THREE questions (20 marks)

QUESTION 4

Dr. Martha has a small clinic. All the files and information of the clinic are manually recorded by the nurse, i.e. Ms. Jane. The records of customer are redundant and inconsistent. Such data records have troubled her so much. She plans to use a simple computer file system and discusses this idea with her son, Jack who is currently taking Database System in Multimedia University. Jack does not agree with the file system. Instead, he has suggested a simple database management system (DBMS).

Based on the above scenario, answer the following questions.

(a) Jack needs to persuade his mother to use DMBS instead of a computer file system.

(i) Define at least THREE limitation of file system. [3 marks]

(ii) Describe with FOUR reasons why DBMS is the best choice. [2 marks]

(b) Dr. Martha requests Jack to develop a simple DBMS. Jack needs to review few basic concepts before he starts. Jack remembers that he should start with business rules.

(i) Please identify the sources of business rules. [2 marks]

(ii) Describe the principles to translate business rules into data model components. [3 marks]

Continued.....

QUESTION 5

(a) Roshan's father has a cycle business. His father keeps track of the inventory using pen and paper. The Ordering and counting inventory process will take several days. Roshan wants to design a database for his father's cycle business. Based on the framework of database life cycle, he should start in phase 1, i.e. database initial study.

(i) In your opinion, what actions he should perform during phase 1? [2 marks]

(ii) What are the possible limitations or constraint of the manual system which Roshan's father is currently practicing? Please list out THREE. [3 marks]

(b) Wei Han and Joon Liang are updating the QtyOnHand in table Inventory at different place but both of them send the requests concurrently. A transaction log file has captured this information: time, name of transaction, steps of command being performed, the stored value if any and whether or not the transaction is committed. Record of the log file is shown in Table 2.

Table 2. Transactions Records

Time	Transaction	Step	Stored Value	Committed
1	T1	Read QtyOnHand	23	-
2	T1	Write QtyOnHand = 23 + 27	50	No
3	T2	Read QtyOnHand	50	-
4	T1	Rollback	23	
5	T2	Write QtyOnHand = 50+6	56	Yes

(i) Based on Table 2, what problem can you observed? [1 mark]

(ii) Describe how is a binary lock works to solve the problem in (i). Please explain by using the transactions, i.e. T1 and T2 in Table 2. [4 marks]

Continued.....

QUESTION 6

(a) Table 3 shows the payment records of students.

Table 3. Payment Records

StuID	Name	Campus	TotalPaid	AmountDue	PaymentDue
1001123052	Martin	Cyberjaya	25000	1800	20/9/2018
1001422336	Simon	Melaka	15000	1500	1/10/2018
1151623002	Dillon	Cyberjaya	30000	1000	29/10/2018
1165523232	Albert	Melaka	20000	2000	21/9/2018
1151123232	Jackson	Nusajaya	45000	1600	21/9/2018

(i) Describe horizontal fragmentation by using the information in Table 3. Please provide the fragment name, condition and student's ID after the fragmentation.

[4 marks]

(ii) In order to well manage the fragmented database as though it were a centralised database, which distribution transparency level is the best? Please justify.

[2 marks]

(b) Data mining tools are getting famous recently due to the rapid information growth in terms of amount. In your opinion, why data mining tools is one of the important trends in database? Please provide FOUR reasons. [4 marks]

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